THREE UNCOMMON GENERA OF THE MITE FAMILY STIGMAEIDAE

(ACARINA)

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Some of the species in the mite family Stigmaeidae are rotund, almost globose types which are extensively covered with relatively thick and dimpled or reticulated plates and which have a prominent 3-pronged sensillum on the apex of the palptarsus. The majority of stigmaeids deviate from this form in various ways. Those described here differ radically from the rotund form of anatomical organization; they have slender, fusiform bodies, almost no idiosomal plating, and the palptarsus bears a single lanceolate spine or several discrete, seta-like eupathids on its apex.

The naked, spindle-shaped stigmaeids to be described are rarely found in Berlese funnel concentrates of microarthropods obtained from samples of leaf mold, humus, moss and lichen. Many hundreds of samples from numerous localities have yielded very few specimens. Consequently there are not enough geographical or ecological data to show where significant populations of these mites are likely to occur. The specimens on hand were collected over a period of about 12 years. It is for this reason that they are called rare or uncommon types.

Genus **Apostigmaeus** Grandjean

Apostigmaeus Grandjean, 1944, Arch. des Sci. phys. et nat., 5me Période, 26:105.

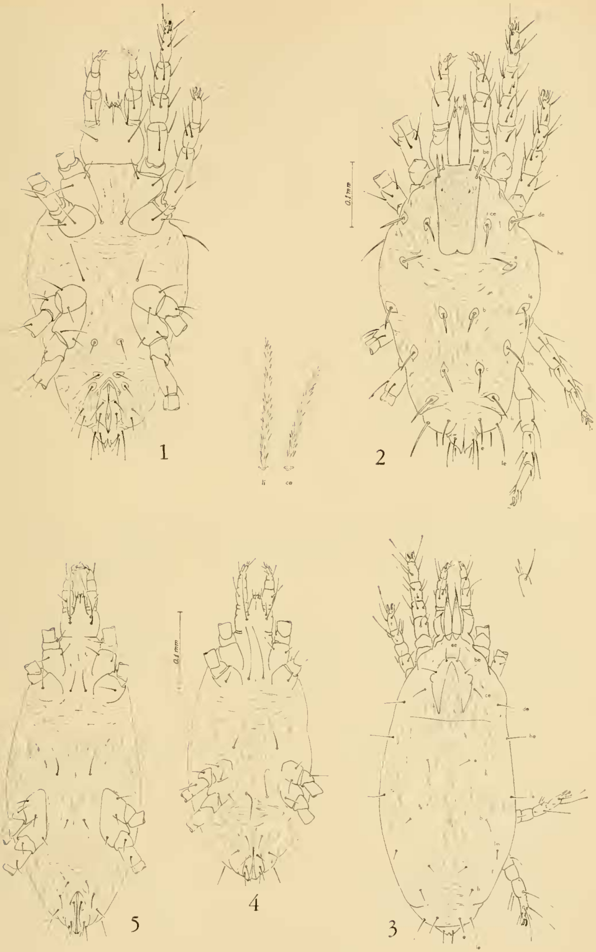
Diagnosis: Stigmaeids having unjoined or separately movable chelicerae and body plating restricted essentially to mid-dorsal section of propodosoma. Propodosomal plate narrow, elongate, bears only setae *ae* and *be*; setae *ce* and *de* not incorporated on this plate. Dorsum of metapodosoma and opisthosoma with sclerotization restricted to very small platelets, one platelet for each seta—except suranals. Dorsal setae: 13–14 pairs. No obvious eyes. Palptarsus slightly longer than tibial claw; it bears a group of minute, simple sensilla instead of an apical trident (multiple eupathid). Tarsus of each leg has a pair of small, slightly curved claws and a multibranched empodium, the shaft of which projects beyond tips of claws before subdividing to produce 3 pairs of capitate raylets.

Type Species: *Apostigmaeus navicella* Grandjean, 1944; monotypic.

Apostigmaeus pacificus, n. sp.

(Figs. 1-2)

Female. Basal pieces of chelicerae slender, fusiform; fixed digits membranous, clearly discernible, coextensive with shafts of movable digits (stylets). Basis capituli and upper maxillicoxal areas covered by somewhat thickened, minutely punctate integument or skeleton; this pattern may also appear on coxae I-IV. Posterior setae on basis capituli very slender, finely pointed, ultralong, at least 59 microns, or long enough to reach bases of adoral setae at apex of rostrum. Idiosoma covered mostly with striated integeument; an unpaired propodosomal plate traverses length of propodosoma, from vertical setae to field of cross-striae between dorsocentral setae



Apostigmaeus pacificus, n. sp. (figs. 1–2). Fig. 1, ventral aspect of female; fig. 2, dorsum. Structural detail of dorsal setae *li* (left) and *ce* (right) between the two upper figures. *Eryngiopus gracilis*, n. sp. (figs. 3, 5). Fig. 3., dorsal view of female; fig. 5, its ventral side. *Eryngiopus microsetus*, n. sp. Fig. 4, ventral view of female. Millimeter scale adjacent to figure 4 also applicable to figures 3 and 5.

c; this plate nearly rectangular, long sides parallel, its width slightly greater than distance separating setae of pair *be*; phase microscopy reveals a delicate recticulum thereon; a pair of dot-like apodemal marks or pits occur on its anterior third, one mark close behind each seta of pair *be*. Seta *ae* and *be* arise on front margin of propodosomal plate; all other dorsal body setae except suranals set on very small individual platelets. Suranal region bears a pair of small suranal plates, two seta on each plate, one of pair *e* and one of pair *le*. Dorsal setae plumose, each with numerous fine barbs appressed closely to shaft; 13 pairs, none conspicuously longer than others; external suranals *le* longest; preoculars *be* barely longer than those nearby; verticals *ae* and dorsocentrals *a*, *b*, *c* subequal. Lateral opisthosomal setae *lr* of *A. navicella* absent in this species. Eyes apparently absent. Intercoxal setae smooth, with very finely pointed tips; first pair between coxae II approximately equal to length of third pair between coxae IV; seta of second pair between coxae III very long (70), widely spaced; one or both setae on coxae I-IV also long, longest ones on coxae I, II. Paragenital setae (or aggenital setae) finely plumose, 4 pairs, subequal; setae of anterior two pairs originate on small individual platelets; seta of two posterior pairs planted close together, those of each side share a platelet which surmounts a faintly elevated area. Five pairs anogenital setae, 2 pairs on genital covers, 3 pairs on anal covers; middle pair slightly longer than first and third. Numbers of setae and special sensilla on legs I-IV: femora 4–4–3–3, genua 6–5–3–3, tibia 7–6–6–6, tarsi 14–9–7–7. Average measurements in microns (n = 5): length idiosoma, vertical setae to anus, 475; seta *be* 82, *a* 64, *le* 106. Males not represented in collections.

Types. Holotype: female, Indonesia (intercepted at Hawaii), Sept. 12, 1961, H. A. Woolford and B. F. Wetzel, on *Oryza sativa*; female, Philippine Islands (intercepted at Hawaii), March 24, 1961, H. A. Woolford, on *Manihot esculenta*; female, Philippine Islands (intercepted at Hawaii), April 17, 1959, H. Woolford, on *Oryza sativa*. All in collection of U. S. National Museum.

Additional Material. France (Hawaii), March 6, 1961, H. A. Woolford, on *Avena sativa*; Tahiti (Hawaii), March 19, 1961, H. A. Woodford, on *Polianthus tuberosa*; Curundu, Canal Zone, March 10, 1961, C. E. Yunker, on porcupine *Coendu rothschildi*.

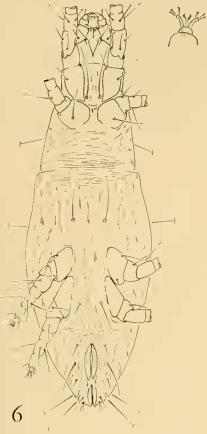
A. pacificus is distinguishable from *A. navicella* in many respects. The new species has 13 instead of 14 pairs of dorsal setae and all are plumose. The dorsal propodosomal plate is an elongate rectangle. *A. pacificus* possesses but 2 pairs of setae on the genital covers. The third pair of paragenitals is not longer than the other 3 pairs of paragenitals whereas, in *navicella*, the length of the third paragenitals much exceeds others of the group. Femur IV of *pacificus* has 3 setae instead of 2.

The occurrence of this mite on an animal, a porcupine, is probably fortuitous. This single specimen, probably brushed from low-growing vegetation, is not distinguishable from the other examples studied.

Eryngiopus, n. gen.

(Gr. eryngion, thistle; pous, foot)

Slender bodied stigmaeids with independent chelicerae. Body plating feebly developed and restricted to small raised areas on dorsum of propodosoma and to



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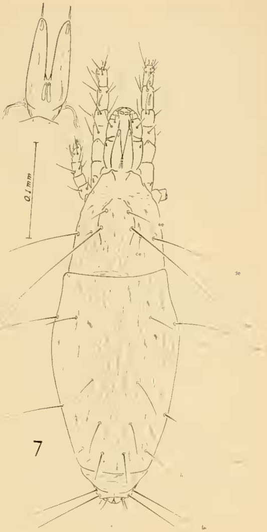

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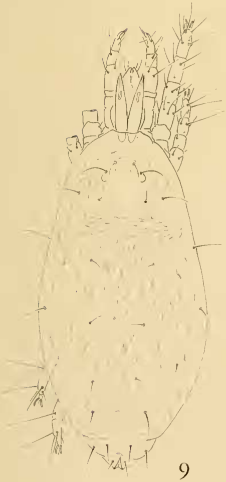

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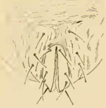

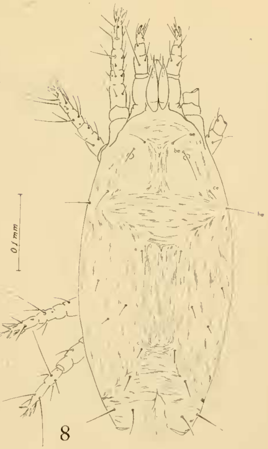

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Barbutia anguineus (figs. 6–7). Fig. 6 venter of female. Detail of pretarsus I at upper right; fig. 7, dorsum of female, with sketch of chelicerae at upper left. *Eryngiopus longurius* n. sp. Fig. 8, dorsal view of female. Detail of female genital area illustrated in insert between figures 8 and 9. *Eryngiopus vagantis*, n. sp. Fig. 9, dorsum of female.

suranal portion of opisthosoma. Idiosoma extensively covered with very finely striated integument, striae predominantly longitudinal, with few whorls or transverse bands. Terminal sensillum on palptarsus a single spikelet, not a trident or cluster of eupathids. One pair of eyes. Dorsal setae: 12–13 pairs, smooth, short, with small range of variation in lengths between different pairs. Ventral setae smooth, flagelliform, one or more pairs ultralong, especially posterior pair on maxillicoxae. Genital plate or plates absent or feebly developed around bases of posteriormost paragenital setae. Pretarsal claws plain, without accessory rays or tenent hairs. Empodium a slender shaft bearing 3 pairs capitate raylets.

Type species: *Eryngiopus gracilis* n. sp.

KEY TO FEMALES OF **Eryngiopus**

1. Genu II without setae; coxae 2–1–2–1 ---------------------------------- 2
   Genu II with one seta; coxae with a different formula ------------------- 3
2. Tibia IV with 4 setae; trochanter IV with one seta; 3 pairs of paragenital setae -- **gracilis** n. sp.
   Tibia IV with 6 setae; trochanter IV without seta; 2 pairs of paragenital setae -- **microsetus** n. sp.
3. Coxae 1–1–2–1; femora 5–4–3–2; propodosoma with 4 pairs of dorsal setae -- **vagantis** n. sp.
   Coxae 2–1–2–2; femora 4–4–2–2; propodosoma with 3 pairs of dorsal setae -- **longurius** n. sp.

Eryngiopus gracilis, n. sp.
(Figs. 3, 5)

Female. Propodosomal plating represented by 2 narrow strips of nude integument between protruding eyes, strips joined together in front, divergent behind, separated medially by wedge-shaped field of longitudinal striae; posterior arms of sclerotized strips attenuated, extend almost to humeral sulcus. Dorsal striae uniformly longitudinal on metapodosoma, transverse only on hinder portion of opisthosoma. Suranal section of opisthosoma delimited by an incomplete transverse fissure; suranal seta *e*, *le* share a denuded area or plate on each side of midline. Dorsal setae simple, comparatively short; humeral setae *he* 27 (all measurements in microns, holotype only), longest of dorsals; dorsolaterals *lm* 13, shortest; all others within this length range. Ventral setae equal to or longer than dorsals; posterior pair on maxillicoxae at least 70, reaches palptarsus when positioned as illustrated; first intercoxal pair 20, second pair 34, third (posterior) pair 27. Three pairs paragenital setae: first 2 pairs equal, not on plates; third pair 50% longer, each seta on an incipient genital platelet. Anogenital covers with 4 pairs setae: 1 pair on genital section, flagelliform, long enough to reach posteriormost extent of anogenital covers; anal section with 3 pairs shorter, more robust setae, subequal, each one less than half as long as setae on genital section. Setae and special sensilla on legs I-IV: coxae 2–1–2–1, femora 4–4–2–2, genua 4–0–0–0, tibiae 6–6–6–4, tarsi 14–9–7–7. Overall length of mite, palpclaw to anus, 495.

Types: Holotype ♀, 5 paratype ♀♀, American Canyon, Solano County, California, February 15, 1951, from willow bark. Holotype retained in collection at Davis, paratypes deposited in United States National Museum and British Museum (Natural History). No other specimens taken.

The possession of only four setae on tibia IV separates *E. gracilis* from its present congeners. Although none of the intercoxal setae on the podosoma is conspicuously long, their relative lengths provide an additional basis for recognizing this species, i.e., second pair > third pair > first pair.

Eryngiopus vagantis, n. sp.

(Fig. 9)

Female. Dorsal plate of propodosoma integral, not invaded by longitudinal striae, covers entire elevated area bounded by eyes and setae *ae, be, ce,* its posterior margin adjoins belt of transverse striae between propodosoma and metapodosoma. A pair of small, circular apodemal marks anteriorly on propodosomal plate, one mark behind each vertical seta, both marks aligned with preocular setae. Dorsal setae fine, smooth, with several size ranges: *be* longest 41; *ae, ce, a, b, c, lm* subequal, 17–20; others of intermediate lengths. Ventral setae ultralong, flagelliform: posterior pair on maxillicoxae 75; first pair intercoxals 30, shortest of its series; second pair at least 80; third pair at least 64. Paragenital setae: 3 pairs, not on plates; first pair 24, second pair 30, third pair 40. Anogenital covers with 4 pairs setae; anteriormost pair flagelliform, approx. 1.5 times longer than each of 3 pairs which follow in succession. Coxae 1–1–2–1, femora 5–4–3–2, genua 4–1–0–0, tibiae 6–6–6–6, tarsi 14–9–8–8. Overall length, palpclaw to anus, 560.

Types: Two co-type ♀♀, 2 paratype ♀♀, 2 nymphs, Napa, Napa County, California, December 22, 1959 (S. F. Bailey and R. O. Schuster), from prune orchard. One co-type deposited in United States National Museum; one paratype in British Museum (Natural History); others filed in mite collection, University of California, Davis.

E. vagantis has several unique features: coxa I has only 1 seta; femur I has 5 and femur III has 3 setae; the dorsal propodosomal plate is not partitioned by median longitudinal striae. The middle (second) intercoxal seta is ultralong; second pair > third pair > first pair.

Eryngiopus microsetus, n. sp.

(Fig. 4)

Female: Body dimensions noticeably smaller but otherwise much like *gracilis* in respect to patterns of striae and relative lengths of dorsal setae. Propodosomal plating feebly developed, represented by a pair of nude areas confined to region of eyes and first 2 pairs of setae, possibly not joined together between bases of vertical setae. Ventral setae all longer than dorsals; posterior pair on maxillicoxae 54 (microns), extends forward to distal ends of palpgenua; first intercoxals ultralong, 72; second intercoxals at least 40; third intercoxals about 45. Only 2 pairs of paragenital setae, none originate on plates. Trochanter IV with seta absent. Coxae 2–1–2–1, femora 4–4–2–2, genua 4–0–0–0, tribiae 6–6–6–6; tarsi 14–10–8–8. Overall length, palpclaw to anus, 410.

Holotype: Female, Moss Beach, San Mateo County, California, no date recorded (W. H. Lange and E. I. Schlinger), from leaf mold under Monterey Cypress. Only example, filed in mite collection, University of California, Davis.

E. microsetus has at least two characters not shared by the other known species: There are only 2 pairs of paragenital setae and trochanter IV bears no seta. First intercoxal seta is ultralong; first > third > second.

Eryngiopus longurius, n. sp.

(Fig. 8)

Female. Plated area of propodosoma completely bisected in midline by a wide band of longitudinal striae; each half of plate triangular in outline, with setae *ae* on or adjacent to its vertex, its base adjoins broad belt of transverse striae on front of metapodosoma; areas referred to as plates also bear extremely faint longitudinal striae. A thinly sclerotized suranal plate arches over hinderpart of opisthosoma. Integumental striae with microtubercles or lobules at widely spaced intervals. Patterns of dorsal striae peculiar to species: extensive bands of striae cross front and rear ends of hysterosoma; longitudinal rows whorl between dorsocentral setae *a* and *b* to create an elongate rectangular figure on middorsum of metapodosoma. Dorsal setae smooth, 12 pairs only—presumably postoculars *ce* absent on propodosoma; *be* = *le*, longest of dorsal setae, 40; *la* 15, *lm* 12, shortest in the dorsal group. Only one pair of ventral setae ultralong: posterior setae on maxillicoxae at least 68; all coxals and intercoxals relatively short, subequal: first intercoxals 24, second 24, third 20. Chaetotaxy of ventral opisthosoma not distinguishable from *vagantis*. Coxae 2–1–2–2, femora 4–4–2–2, genua 4–1–0–0, tibiae 6–6–6–6, tarsi 14–10–8–7. Numerous setae uppermost on appendages unusually long, flagelliform, e.g.: dorsal seta on tibia III 50, on tibia IV 68; dorsal setae on tarsus IV at least 64. Overall length, palpclaw to anus, 550.

Male. Somewhat smaller than female, 480 overall, but recognizable according to qualitative characters ascribed to podosoma of opposite sex. Opisthosoma with most structural features common to other stigmaeid males. Dorsal striae whorl between setae *a* and *c* to form rectangular figure.

Types. Holotype ♀, allotype ♂, Nortonville, Contra Costa County, California, Oct. 15, 1952 (W. C. Bentinck), from saltgrass (*Distichlis* sp); Paratype ♀, 7 mi. west of Parker Dam, San Bernardino County, California, Feb. 24, 1951 (C. D. McNeill) from soil in shrub thicket. Holotype in U. S. National Museum, others retained in collection at Davis.

Microtuberculate striae and the whorling of striae middorsally between setae of pairs *a* and *c* are useful spot characters for *E. longurius*. There are only 12 pairs of dorsal setae whereas 13 pairs is the common number. Also unique is the presence of 2 setae on coxae IV. The intercoxal setae on the podosoma are comparatively short and subequal.

Barbutia Oudemans 1927

Small, emphatically fusiform species, with humeral sulcus clearly a line of body flexion. Chelicerae fused together along basal halves to form a U-shaped stylophore. Short peritremata on dorsomedian surface of stylophore. Idiosoma without obvious plates; a broad, ovoid elevation with 2 pairs setae occurs on propodosoma, between eyes; integument covering elevation striated and possibly more rigid than integument elsewhere. Thirteen pairs dorsal setae, some ultralong. One pair of eyes. Genital and anal apertures of female proximate but not sharing common covers; genital covers without setae; 3 pairs paragenital setae. Pretarsi sessile; claws diminutive, each claw with 2 pairs tenent hairs; these very short, capitate. Minute empodium with possibly 2 pairs capitate raylets.

Type Species: *Stigmaeus anguineus* Berlese, 1910. Monotypic.

Barbutia anguineus (Berlese)

(Figs. 6–7)

Stigmaeus anguineus Berlese, 1910, Redia 6:204.

Stigmaeus (*Macrostigmaeus*) *anguineus*, Berlese, 1910, Redia 6:208.

Macrostigmaeus anguineus, Oudemans, 1923, Ent. Ber. Nederland. Ent. Ver. 6:146.

Barbutia anguineus, Oudemans, 1927, Ent. Ber. Nederland, Ent. Ver. 7:260.

Female. Chelicerae with short, anteriorly directed stylets; proximal segments fused together near basal ends to form a deeply cleft, U-shaped stylophore. Peritremata located on dorsomedian surface of stylophore; these comprise a pair of juxtaposed tubes, or grooves, which extend straight backwards a short distance from points of origin in apex of cheliceral notch. Palpi with tibial claws opposable, tending to meet slightly in front of cheliceral stylets; each claw large in relation to segment which bears it, and equipped with a sharp spine, or tooth, on its concave edge. Palptarsi noticeably club-like, swollen at distal ends. Rostrum truncate anteriorly, lateral lips flared, with 2 pairs inconspicuous adoral setae. Propodosoma with smaller girth than hysterosoma, humeral sulcus appears to allow telescoping of these body sections; dorsomedian surface of propodosoma surmounted by a broad, oval elevation. One pair of eyes. Integument of dorsum entirely striated, striae faint, predominantly longitudinal and with small granules disposed at widely spaced intervals along or between them. Striae of venter without granular ornamentation; a wide belt of transverse striae occupies sternal area behind coxae II; those in vicinity of propodosomal-hysterosomal junction assume form of broader, interdigitating rugae. Sclerotized plates not evident. Thirteen pairs completely smooth dorsal setae, all flagelliform, most so finely pointed that total lengths cannot be precisely determined; setae classed in 4 size ranges with approximate lengths and presumed homologies with corresponding setae of other stigmaeids as follows: ultralong—*be* 156, *e* 144; long—*de* 82, *he* 86, *lm* 86, *le* 94; intermediate—*a* 51, *b* 39, *c* 31, *li* 39; ultrashort—*ce* 12. Ventral setae of intercoxal areas: first pair 55, reaching from base of coxa I to palptrochanter; second pair 39; third pair 27. Three pairs paragenital setae, middle pair longest: first 12, second 31, third 8. No setae on genital covers; 3 pairs on anal covers, short, subequal. Inclusive counts of setae on leg segments: coxae 2–1–2–0, femora 4–3–2–2, genua 6–0–0–0, tibiae 6–5–3–3, tarsi 12–8–8–8. Sensillum *k* on genu I solenidiform, not spine-like. Tarsi abruptly rounded distally, without tapered peduncles; claws very small, each with 2 pairs capitate raylets arising near its distal end. Empodium with one pair, or possibly 2 pairs, capitate raylets. Length of mite when positioned as illustrated, palpclaw to anus, 418.

Male. Closely resembles female in respect to prosoma and legs I-II; extra (male) solenidion does not appear on tarsi I-II; solenidion on tarsi III-IV noticeably larger and dorsal setae on hysterosoma much shorter than described for female. Opisthosoma conical, with 1 pair paragenital setae below. Aedeagus a slender, straight shaft, upcurved near tip.

Distribution. One collection, 5 specimens, Pigeon Point, San Mateo County, California, July 12, 1958, D. W. Price, from mulch in shrub thicket.

Berlese's original illustration of *B. anguineus* is complete enough to allow probable identification of the species without reference to type specimens. He did not, however, give sufficient information about peritremes, claws and general chaetotoxy to reveal its distant affinities with species in other stigmaeid genera. Oudemans (1927) separated *Macrostigmaeus serpentinus* Berl. and M. *anguineus* Berl. by creating a new genus, *Barbutia*, for the latter. In 1931, he assigned both genera to his new family, the Stigmaeidae.

Although other genera of this family contain small fusiform species having almost no plate-like armature, *Barbutia* is unique in several respects: the palpi appear to function as opposable, pincer-like appendages; the stylophore bears dorsal peritremes, as in caligonellids; and the claws have raylets or tenent hairs, as in tetranychoids. Also the genital and anal pores are independently covered and the chaetotaxy of the legs deviates considerably from stigmaeid patterns. Since *Barbutia* cannot be properly referred to any other family in the presently constituted superfamily Raphignathoidea, it is expedient to maintain the *status quo* until the systematics of this group of families is better understood.

Grandjean's nomenclature of dorsal setae is applied to *B. anguineus* without certainty of the true homologies. The humeral setae *he* and the first lateral hysterosomals *la* are the key setae in question. If the writer's assumption happens not to be the correct one of several possibilities, then the labels applied to at least seven of the hysterosomal setae (fig. 7) would be improper.

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